
The Contribution of Software and IT Services Industries to the Chinese Economy

John F. Gantz

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WHITE PAPER

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IN THIS WHITE PAPER

Substantial economic evidence now available shows that information technology (IT) makes important contributions to productivity, organizational transformation, and growth at the firm level and to national economies. In this white paper, IDC examines the contributions that software and IT services have made and are expected to make to the growth of China's economy. IDC's analysis indicates that substantial investments in IT (hardware, software, and services) will have major direct and indirect positive contributions to growth. These IT investments will come from a mix of Chinese companies and local suppliers, and the leading international developers and suppliers. The contributions consist of jobs created, taxes generated, IT innovation, and economic growth. The white paper quantifies the benefits to China from the positive relationship between local markets and internationally based suppliers. The research indicates that continuing China's current level of nearly double-digit economic growth will require both the further development of local IT producers and increased participation in the market by leading international IT firms.

EXECUTIVE SUMMARY

IDC's research shows that the IT sector is of *growing* importance to the Chinese economy. Since 1989, IT has accounted for just 2% of GDP growth. By 2005, the importance of IT had increased by almost 500%, accounting for almost 10% of GDP growth. Spending on IT in China is growing fast — growth was up 12% in 2005.

Yet challenges remain for China. China's IT spending as a percentage of GDP is far below that of other major economies. Local China-based suppliers, government organizations, and international software and IT services firms are working in partnership to increase the pace and sophistication of the incredible IT modernization already under way. Some of the benefits of this local-international collaboration are:

- ☐ **New revenues.** Domestic IT spending has grown from \$23.6 billion¹ (195.4 billion RMB) in 2003 to \$30.5 billion (252.7 billion RMB) in 2005. It is expected to grow by another \$4.3 billion (35.6 billion RMB) to a total of \$34.8 billion (288.3 billion RMB) in 2006.

¹ The \$ symbol denotes U.S. dollars unless otherwise specified. RMB equivalent is shown for context.

- ☒ **New jobs.** By the end of 2006, the IT sector alone will have added 1 million new jobs to the Chinese economy since 2003; over half of those new jobs will be software-related.
- ☒ **More tax revenue.** By the end of 2006, those new jobs and IT spending will have pumped almost \$3.2 billion (26.5 billion RMB) into the economy since 2003.
- ☒ **New investment.** In 2005, international firms alone invested \$3.5 billion (29 billion RMB) in local operations and other foreign direct investment.

International and China-based software and IT services suppliers share the domestic market in almost equal proportions. This mix of local and international suppliers is good for the Chinese economy. Local firms develop and support software that runs on platforms from international firms; international firms rely on local distribution and IT services firms to reach the market.

The research shows that:

- ☒ Chinese companies choose domestic and international suppliers on the same criteria: Does the supplier have the solutions that fit the need at the time? Are the solutions of high quality? Can the supplier support all of a company's operations? Almost half of the respondents to a survey of top echelon CIOs conducted for this paper used a mix of local and international suppliers; another 7% had no preference.
- ☒ Of the 500,000 new software-related jobs that will have been created between 2003 and the end of 2006, half will accrue to local suppliers and half to international suppliers. Software-related employment is growing at almost 20% a year among local suppliers and 17% among international suppliers.
- ☒ Perhaps the most noteworthy finding is the positive multiplier effect international software and IT services companies have on the Chinese economy. IDC estimates that every \$1.00 or 1 RMB of revenues attributable to international suppliers generates at least \$2.50 or 2.5 RMB in local supplier revenues through locally developed software and IT services on both local and international platforms. Examples of this collaboration abound between local and international suppliers.

For China's economic growth to continue at near double-digit rates, IDC's research indicates that investment in IT must continue at a pace that exceeds that of GDP growth. Our research also indicates that the market both requires and is well served by this healthy balance of local and international suppliers. Both groups will be needed to create an increasingly robust Chinese IT industry.

INTRODUCTION: THE IMPORTANCE OF IT

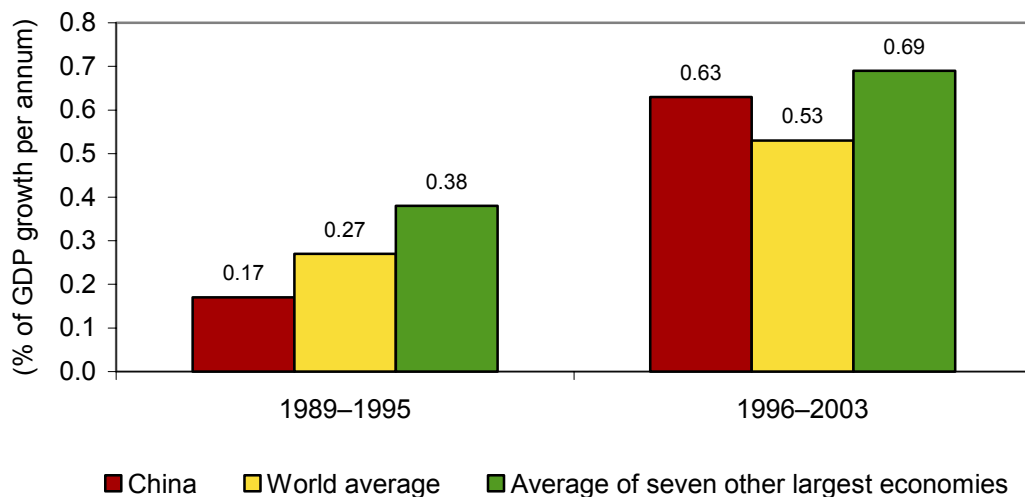
China's economic growth over the past two decades has been nothing short of spectacular, increasing tenfold since 1978.² For the past three years, the Chinese economy has grown close to 10% a year.³ By the end of 2006, China will be the fourth-largest world economy after the United States, Japan, and Germany,⁴ and this growth trend is expected to continue.

This economic growth is a result of a combination of factors, including expansion in capital inputs, labor growth, better labor utilization, and productivity improvements. The positive contribution of many of these factors is directly related to the deployment of IT. The connection between IT and economic growth has been well documented. For example, one study has found that IT investments provide short-term returns and that the benefits accrue over time — with overall benefits amounting to as much as two to five times the value of the short-term investment.⁵

There is substantial evidence that IT has made a significant contribution to China's economic growth.⁶ **Figure 1** shows the degree to which IT has contributed to China's GDP growth compared with the world average and that of the seven other largest economies from 1989 to 1995 and from 1996 to 2003.⁷ Between the two periods, GDP growth in China attributable to IT increased by more than 300%, and in the latter period, IT's contribution to GDP growth in China was higher than the world average.

FIGURE 1

IT-Related Output Growth



Source: Jorgenson and Vu, 2005

² *The World Factbook*, CIA publication, updated January 10, 2006.

³ *The New York Times*, January 25, 2006.

⁴ The Economist Intelligence Unit forecasts as of January 2006.

⁵ "Computing Productivity: Firm-Level Evidence," Erik Brynjolfsson and Lorin M. Hitt, MIT Sloan School of Management, working paper 4210-01, June 2003.

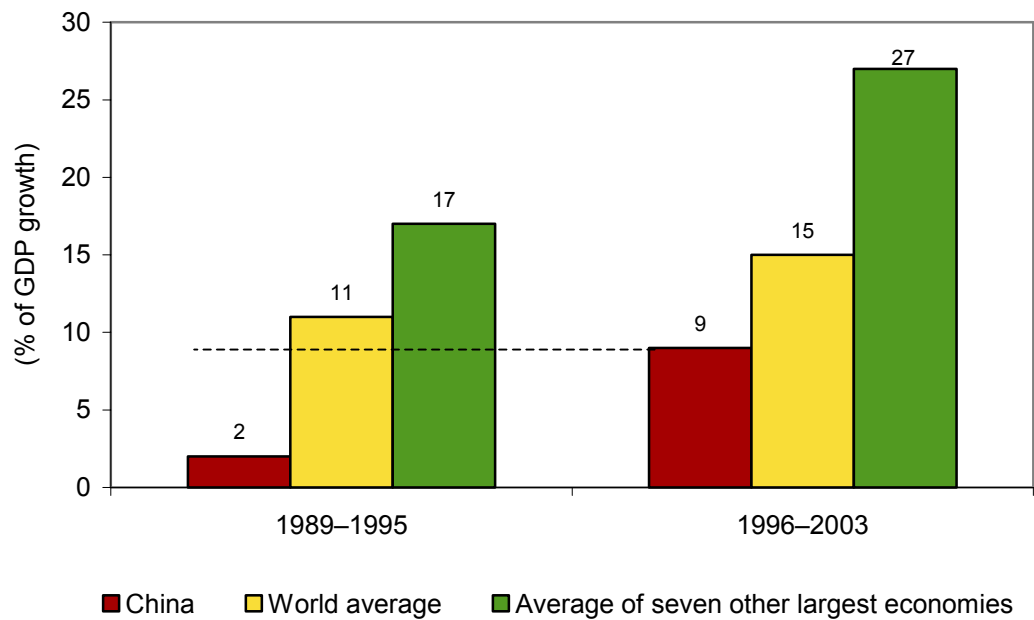
⁶ "Information Technology and the World Economy," Dale W. Jorgenson and Khuong Vu, *Scandinavian Journal of Economics*, December 2005.

⁷ Canada, France, Germany, Italy, Japan, United Kingdom, United States.

Nonetheless, China can still make substantially more gains in economic growth through the increased use of IT. **Figure 2** shows the *share* of economic growth attributable to IT in China, which increased from 2% to 9% from the first period to the second period. However, even at 9%, China still lags behind other major economies — the average share of growth attributable to IT is 15% for all economies, and 27% for the seven other largest economies.

FIGURE 2

IT Share of Output Growth

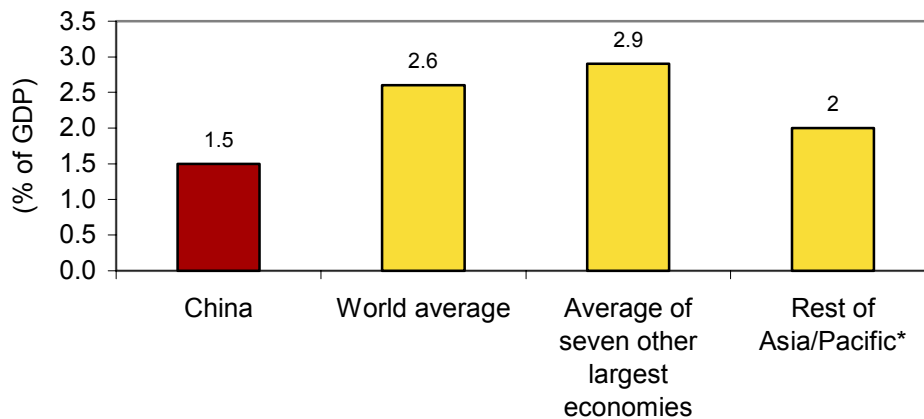


Source: Jorgenson and Vu, 2005

One of the key reasons for these disparities is the rate of investment in IT in China (see **Figure 3**), which is lower as a percentage of GDP than that of the competitor economies. In 2005, China's IT spending was 1.5% of GDP, while the seven other major economies had an IT investment of 2.9% of GDP, and the worldwide average weighted by size of economy was 2.6%.

FIGURE 3

IT Spending as a Percentage of GDP



Note: * Rest of Asia/Pacific excludes Japan and China.

Source: IDC's IT Economic Impact Study, 2006

The trends are clear. China's investment in IT has paid dividends in economic growth. With continued investment, there will be even more economic growth to come. Meanwhile, to compete with the major world economies, China will need to have a higher rate of IT investment and increase the percentage of GDP spent on IT.

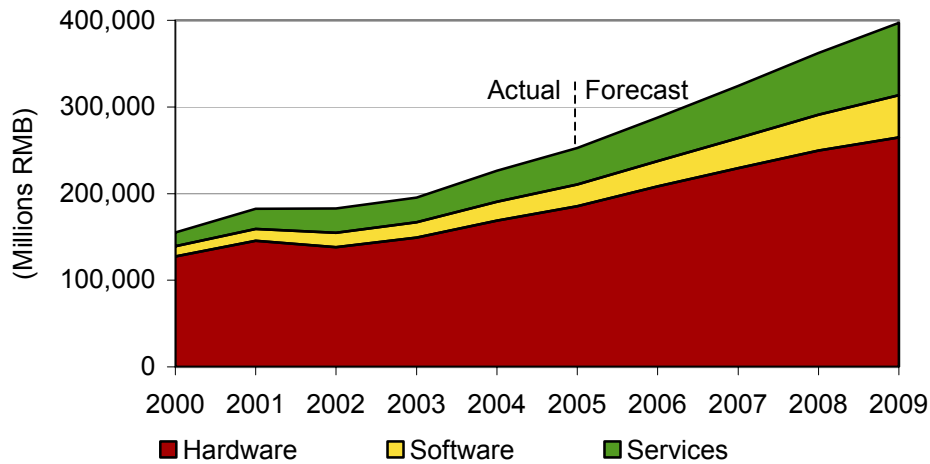
CHINA'S IT MARKET

China's IT market is on the right track. From 2004 to 2005, China's IT spending increased by more than 10%, from \$27.3 billion (226.2 billion RMB) to \$30.5 billion (252.7 billion RMB). This trend is projected by IDC to continue over the next five years. IDC forecasts that China will have the sixth largest five-year compound annual growth rate (CAGR) in IT investment from 2005 to 2009 among the 55 countries that IDC tracks. The only countries expected to grow faster are Russia, India, Turkey, Indonesia, and Vietnam, but it should be noted that in 2005, the combined IT spending of these countries was less than that of China. In addition, China is the only one of these countries that is expected to *increase* the rate of IT spending in the next five years.

Figure 4 shows IDC's historical and forecast data for IT spending within China, indicating that spending will more than double within 10 years.

FIGURE 4

China's IT Market



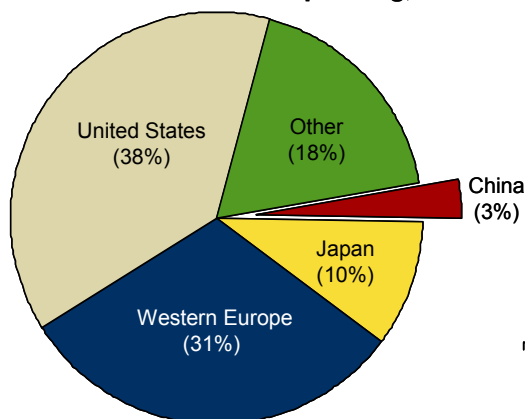
Source: IDC's *Worldwide IT Spending Patterns: Worldwide Black Book*, 2006

Interestingly, despite China's impressive growth and investment in IT to date, China has only a 3% share of the worldwide IT market, as **Figure 5** illustrates. This is comparable to China's share of worldwide GDP of over 5%.⁸

FIGURE 5

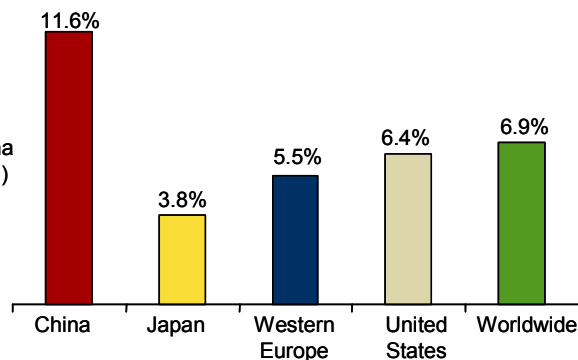
China's IT Market in Context

Share of Worldwide IT Spending, 2005



\$1,080 billion (8,950 billion RMB)

IT Spending Growth, 2005



Source: IDC's *Worldwide IT Spending Patterns: Worldwide Black Book*, 2006

⁸ The Economist Intelligence Unit forecasts as of January 2006.

On the other hand, **Figure 5** also shows that China's IT spending growth in 2005 was almost double that of the worldwide average.

Hence, a double challenge lies ahead for China: using IT to improve domestic productivity and living standards, and using IT to help support its growing export economy. IDC's annual study on information economies around the world⁹ looks at many per-capita IT penetration rates — such as PCs per household and Internet users as a percentage of the population. IDC's most recent such study shows China ranking well behind other major economies on a number of IT-related measures. For instance, the study found that, in 2005, out of 53 economies ranked, China was:¹⁰

- ☒ 45th in computer penetration
- ☒ 27th in Internet usage
- ☒ 39th in advanced telecommunications

IMPORTANCE OF SOFTWARE AND IT SERVICES IN CHINA

IDC believes that there is an important connection between an economy's effective use of technology to promote productivity and economic growth, and its spending on software and IT services to get the most out of that technology. IT services, for instance, include everything from support and training to asset management, integration of new technology with existing technology, and localization.

IDC uses this relationship between technology and software and IT services — specifically the ratio of software to hardware spending — in its ranking of information societies. IDC does so under the premise that more sophisticated business applications and computerized processes require more complex software. This, in turn, requires more complex third-party IT services — for custom development, systems integration, IT planning, maintenance, outsourcing, and so on. Hence, IDC believes that, in general, the higher the proportion of software to hardware, the more robust the information economy.

How does this ratio play out in the market? At the worldwide level, end-user spending on packaged software was \$221 billion (1.83 trillion RMB) in 2005, or 20% of total IT spending of \$1.08 trillion (8.95 trillion RMB). IT services accounted for another 41%, for a total of 61%. The remaining 39% was spent on hardware. Among the seven other largest economies referenced in **Figures 1, 2, and 3**, software and IT services accounted for an even higher percentage (66%) and were the fastest-growing segments of the IT industry.

⁹ *Information Society Index, 2005: Rankings and Data*, IDC #34442, November 2005. The Information Society Index (ISI) has been published for more than 10 years.

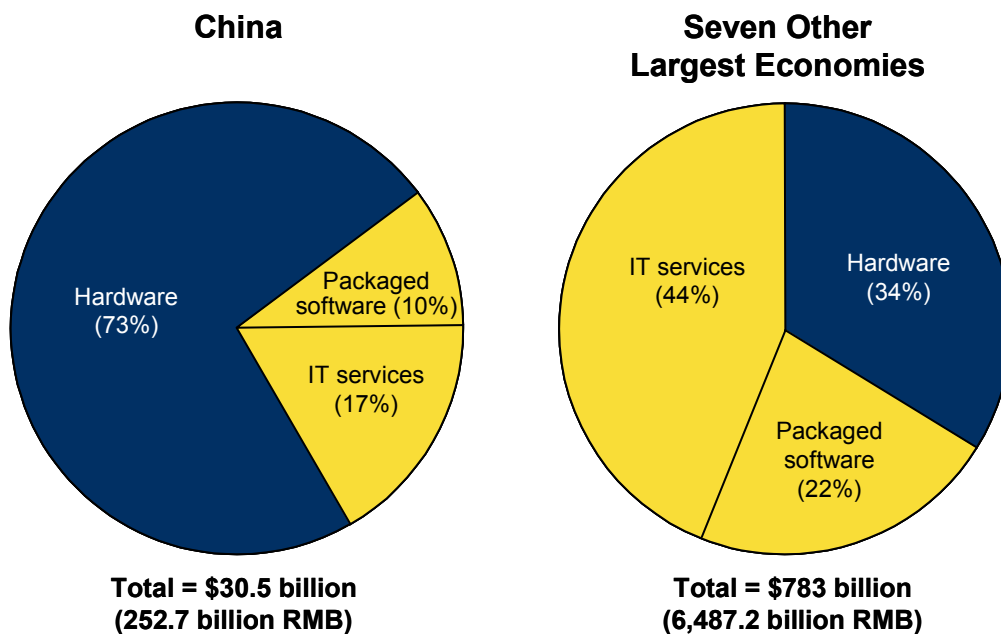
¹⁰ It should be noted that because the rankings are based on per-capita measurements, the results are not entirely surprising. For example, India, with its own large population, ranks lower than China in some metrics.

In 2005, as shown in **Figure 6**, the spending ratios in China were considerably different from those in the seven other largest economies shown. In China, packaged software accounted for only 10% of spending and IT services for just 17% compared with 22% and 44%, respectively, in the seven other largest economies.

It is possible that internal labor is being substituted for external spending on packaged software and IT services. If this is the case, IDC believes that the long-term advantages of using more industry-standard software and IT services developed for that software far outweigh the advantages of substituting labor for investment. Another factor may be the installation and use of unlicensed software, which would not be captured in the IDC spending figures.

FIGURE 6

Software and IT Services Gap: IT Spending, 2005



Source: IDC's *Worldwide IT Spending Patterns: Worldwide Black Book*, 2006

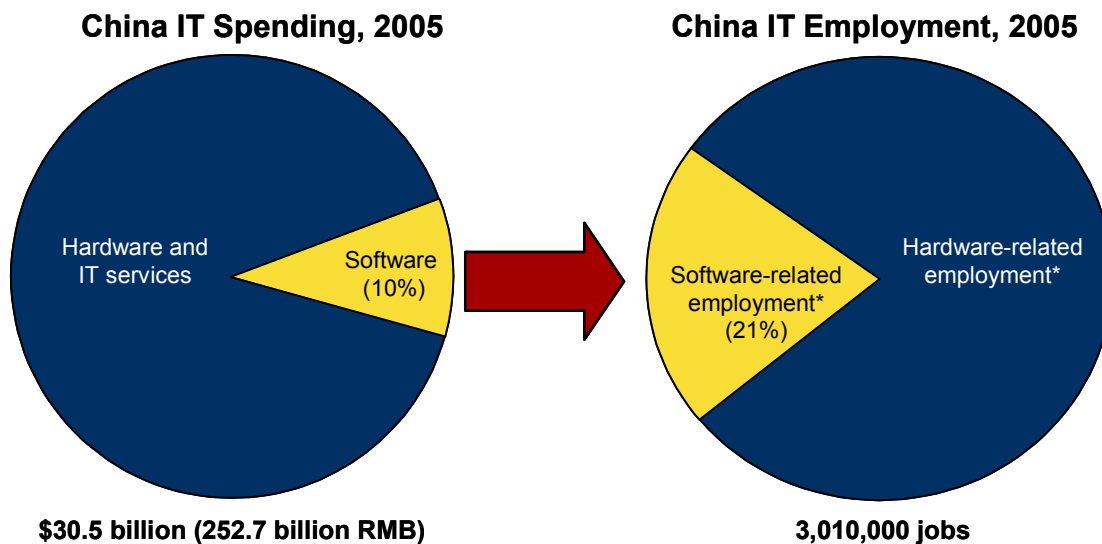
Increased use of software has a positive multiplier effect on economic activity. Software drives downstream activity for the local IT services market and in the distribution channels. New software applications must be integrated with existing applications, end users need to be trained, and new applications must be developed and managed. The net result is more jobs and better productivity overall.

IT departments in China and other countries show this positive dynamic. IDC's daily contact with IT executives around the world confirms that staff activities are not allocated in proportion to software spending as a percentage of total hardware and software spending. Instead, they are weighted toward software-related activities.

Figure 7 shows IDC's estimate of the relationship between China's domestic IT spending on software and employment in the IT industry in 2005. IDC estimates that for every \$1.00 or 1 RMB of revenue from packaged software, at least another \$1.25 or 1.25 RMB was spent in IT services. In addition, packaged software and additional IT services also drove at least another \$1.00 or 1 RMB in channel revenue. Thus, every \$1.00 or 1 RMB spent on software generated \$2.25 (or 2.25 RMB) or more of additional economic activity, revenue that, in turn, supports local employment.¹¹

FIGURE 7

Software's Influence on Employment



Note: * Employees at software vendors, IT services and channel firms, and IT organizations; excludes export-related employment.

Source: IDC IT Economic Impact Study, 2006

In **Figure 7**, IT services and channel activities have been allocated as either software-related or hardware-related. The figure does not include employment related to the exports of software and IT services because it would not equate to local spending.¹²

IDC forecasts that over the next five years, domestic spending in China on software and IT services will grow at twice the rate of spending on hardware — as companies deploy increasingly sophisticated and complex IT solutions — which will help drive China's information economy forward. As **Figure 7** illustrates, because of the high multiplier effects associated with spending on software, this investment in software will yield dramatic new job creation.

¹¹ IDC estimates of software-related services and channel activities are based on market sizing of IT services by activity, analysis of IT services contracts, and interviews with industry and IT users and executives. See also the Study Definitions and Methodology section at the end of the paper.

¹² In most analyses of IT-related employment or taxes, IDC has included export activity because it generates employment and taxes within China; for **Figure 7**, we have eliminated export activity in order to create a more accurate relationship between domestic software spending and software-related employment. Thus, we have also removed hardware export-related employment, which, in China, is considerable.

CONTRIBUTION OF SOFTWARE AND IT SERVICES

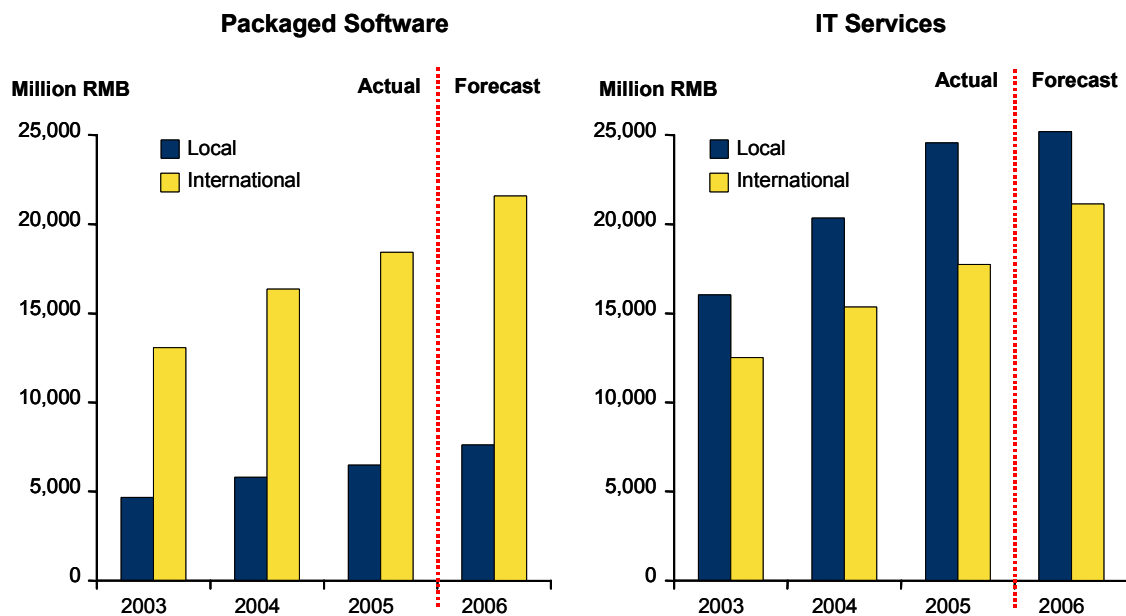
The current domestic IT market in China is served by a mix of local China-based firms and international developers and vendors. A growing Chinese market presents substantial new opportunities for both domestic and international IT suppliers.

IDC's tracking of the Chinese market shows that China-based vendors are growing their businesses rapidly and that international firms continue to make substantial investments in local operations.

As **Figure 8** illustrates, China-based suppliers are steadily increasing output in both packaged software and IT services. IDC's market trackers measure the market share of packaged software products, and in 2005, China-based firms accounted for 26% of the market, while international firms accounted for 74%. For IT services, the market share of local firms exceeded that of international suppliers, with local firms accounting for 58% of the market in 2005. It is noteworthy that spending on Chinese software and IT services is increasing steadily, and the upward trend is projected to continue.

FIGURE 8

IT Spending by Supplier Origin



Source: IDC's IT Economic Impact Study, 2006

Based on this data, it is reasonable to predict that China's need for continual IT investment to support economic growth will be met by a mix of local and international software and IT services suppliers. The local firms have the advantage of proximity to the market and grounding in the culture; the international companies have the advantage of a diverse array of products and services, and global resource pools from which to draw talent and capital. They also have economies of scale in supporting China's own international computer-using enterprises.

International firms continue to make a substantial contribution in areas that require implementation of complex systems for critical sectors of the economy, including banking, communications, and transportation.

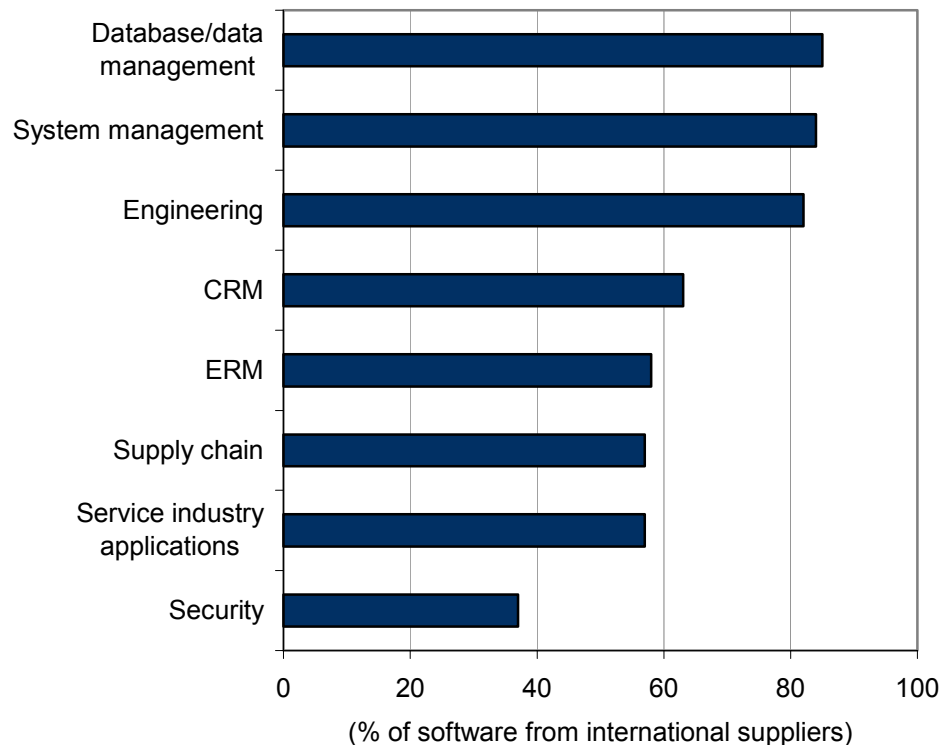
IDC has tracked the 50 largest IT services deals in China from 2000 to 2006. Many of these deals were large systems integration projects, enterprise resource management (ERM) installations, or communications infrastructure deployments for large Chinese banks, telecom operators, and transportation companies, such as China Minsheng Banking Corporation (using Accenture and SAP to help revamp its core banking system), Air China (using system management and security software from CA), China Mobile (using systems and IT services from IBM, HP, and others), and China Ocean Shipping (using HP consulting services). Many of the international firms worked through local subsidiaries or joint ventures.

IDC market data by software category also illustrates the importance of the availability of software from diverse international firms to China's IT-using enterprises. IDC tracks three major classes of packaged software in China — application software, system infrastructure software, and application development and deployment software. IDC also tracks 20 submarkets, from application life-cycle management tools to operating systems to large enterprise applications.

Figure 9 shows that in 2005, international software developers played a key role in some of the largest and most business-critical categories.¹³ **Figure 9** also shows that in a number of key areas, such as security, supply chain management, and ERM, Chinese firms also played a key role, providing almost half and sometimes more of the supply.

FIGURE 9

International Software Share of Key Applications



Source: IDC's China Software Tracker, 2005

It is clear that the software of international corporations is deeply embedded in the daily business of China's economy and is, therefore, a contributor to that gain in economic output from IT discussed earlier. It is also clear that Chinese companies are playing an increasingly important role in the software industry. This *combination* is propelling the competitiveness of China's software industry and providing IT users with more and better IT tools to ensure their competitiveness in a global market.

¹³ In **Figure 9**, the **database/data management** category includes database management systems and data warehouses; **system management** software includes software that manages elements of the computing complex itself and is separate from network management; **engineering** applications include computer-aided design and engineering and technical computing; **CRM** is customer relationship management and typically supports call center operations, marketing, and sales force automation; **ERM** is enterprise resource management and generally links financial systems with inventory systems; **supply chain** software automates the flow of information from suppliers to OEMs, such as order entry, pricing, bid support, and inventory tracking; **service industry applications** include financial and asset management for service firms, such as banks; **security** software includes virus protection, firewalls, intrusion detection, and identity management and authorization. For more detailed descriptions, see *IDC's Software Taxonomy, 2005 study*, IDC #32884, February 2005.

INTERNATIONAL IT INVESTMENT IN CHINA

In addition to the contributions made through international software and IT services firms' products and services, the direct and indirect investments in China of these firms make a substantial contribution to China's economy. These investments take a variety of forms, from establishing local subsidiaries or buying equity in joint ventures to investing in China-based R&D and IT services delivery, supporting local universities and development funds, and participating in venture capital funds that invest in China.

Based on results for the first seven months of 2005, foreign direct investment into China in 2005 totaled over \$55 billion (455.7 billion RMB).¹⁴ About 70% of this investment went into wholly owned subsidiaries, 23% into equity joint ventures, and the rest into contract joint ventures. Manufacturing concerns were responsible for much of this investment, but the contributions of software and IT services firms were significant. Examples of such software and IT services investments include:

- ☒ In 2004, Autodesk, through its Discreet subsidiary, now known as its Media and Entertainment division, started developing a localized version of its 3D Studio Max 3D modeling, animation, and rendering software, which is used worldwide for the development of digital media, TV, and games. That localization, and the training that Autodesk supplies with it, offers a new competitive advantage for China's video and game designers. In 2005, for instance, using Autodesk software, China Central Television (CCTV) expanded its capabilities for postproduction capabilities to prepare it for the 2008 Olympics and to offer high-definition programming.
- ☒ SAP, third in the China ERM market,¹⁵ opened a global support center in Dalian in 2004, which followed the opening of an R&D lab in China in 2003. That lab now employs about 400 people and is expected to expand to over 1,500 by 2009. Today, the company has over 1,000 employees in China.
- ☒ Early in 2002, Cadence began to evolve its existing sales joint venture company into four direct sales, support, and R&D offices in China, located in Beijing, Shanghai, Chengdu, and Shenzhen. Later that year, Cadence opened its High-Speed Technology Center in Shanghai to provide local education and customized design solutions. In 2003, Cadence signed a letter of understanding with the Ministry of Education (MOE) to develop China's first IC design training program, setting the framework for the China National IC Design Talent Incubation Program.
- ☒ In 2005, Microsoft invested about \$100 million (828.5 million RMB) in R&D in China. The company, which already has 800 people working in its China R&D lab, expects to further expand in the coming years. In 2005, the company formed a joint venture with Shanghai Alliance Investment Limited to launch MSN China. From 2002 to 2005, the company worked closely with China's National Development and Reform Commission (NDRC) to boost the local software industry. The cooperation amounts to \$750 million (6.2 billion RMB), including investment, training software engineers in the country, hardware procurement, and technical cooperation. The company makes its Xbox in China and has bought equity stakes in a number of local companies.

¹⁴ The U.S.-China Business Council, 2006. Contracted FDI was over \$159 billion (1,318 billion RMB).

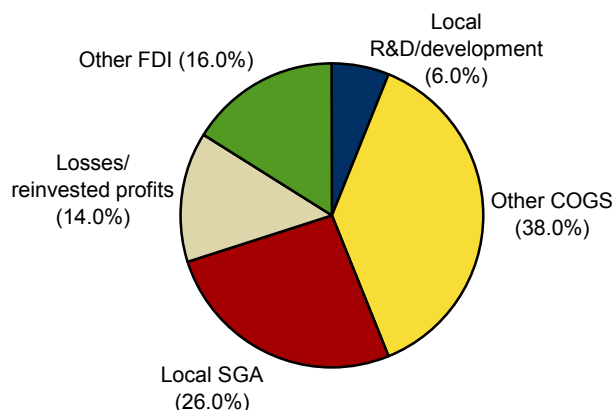
¹⁵ Local companies UFIDA Software (also known as UFSOFT) and Kingdee International Software Group claimed the top 2 spots.

- ☒ IBM, which has been investing in China for many years, opened its first wholly owned subsidiary in 1992 and followed up with one of the first foreign R&D labs in 1995. In 1999, the company set up a software development lab in Shanghai, which now has over 2,000 employees. Since then, the company has launched a number of service delivery centers, innovation centers to support small and medium-sized businesses as part of its labs, and even a venture capital arm that works with a network of other venture capital firms to help launch Chinese start-ups. IBM has over 5,000 non-manufacturing employees in China, including research, marketing, sales, software development, and service delivery employees.

Such investments are so important that IDC found that about 70% of revenues generated in the domestic Chinese market by international IT companies stay in China (see **Table 1** later in this document). This is because they spend on local service delivery, marketing, sales and distribution, and growing China-based R&D and product development. **Figure 10** quantifies these investments for 2005. In coming up with the figures, IDC relied on industry-standard financial ratios, IDC research on software and IT services companies' marketing mix and service delivery components, and external estimates of foreign direct investment by non-Chinese international firms.¹⁶

FIGURE 10

Investments of International Firms* in China



2005 = \$3.5 billion (29 billion RMB)

Notes:

- IDC estimates are based on standard industry ratios and public FDI statistics.
- * International software and IT services firms.

Source: IDC, 2006

¹⁶ IDC has conducted a number of proprietary studies that provide insight into the cost allocation of private and public software and IT services companies. The general assumption for allocating those costs to China-based spending versus non-China-based spending was that a majority of R&D and development spending took place outside China but that a good portion of marketing (less product marketing) and sales and some general and administrative (G&A) spending took place in China. In **Figure 10**, "local SGA" represents the spending on sales, marketing, and G&A that stays in China. Cost of goods sold, or COGS, is the product development and service delivery that takes place in China. The additional foreign direct investment (FDI) was derived as spending by these companies not already counted. The figure is a conservative 1% of all 2005 FDI in China. See also the Study Definitions and Methodology section at the end of the paper.

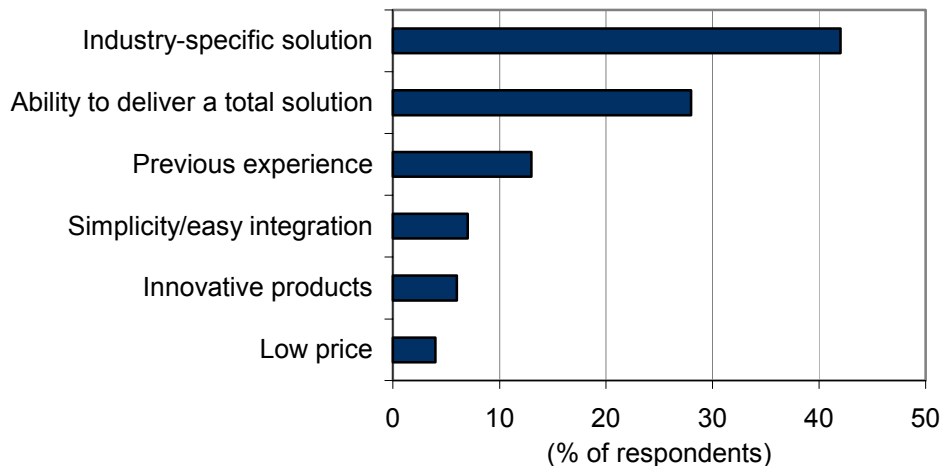
REASONS TOP CIOs CHOOSE PARTICULAR SUPPLIERS

As part of understanding the importance of international software and IT services firms to the local Chinese market, IDC surveyed CIOs and IT executives in China on the attributes they look for in a vendor and their decisions on use of China-based and international suppliers. The surveying took place in two stages.

In December 2005, IDC surveyed CIOs and other IT executives in China on the specific attributes they look for in an IT vendor.¹⁷ **Figure 11** shows the results. Availability of industry-specific solutions was the most commonly cited attribute, followed by the ability to deliver a total solution. Low price was not highly rated.

FIGURE 11

Key Attributes of an IT Supplier



n = 100

Source: IDC survey of IT executives in China, December 2005

One interpretation of these results is that, in order for Chinese companies to support rapid economic growth, access to both industry-specific and horizontal solutions is a high priority. The alternative for companies is to acquire separate component products and spend additional money and time integrating them.

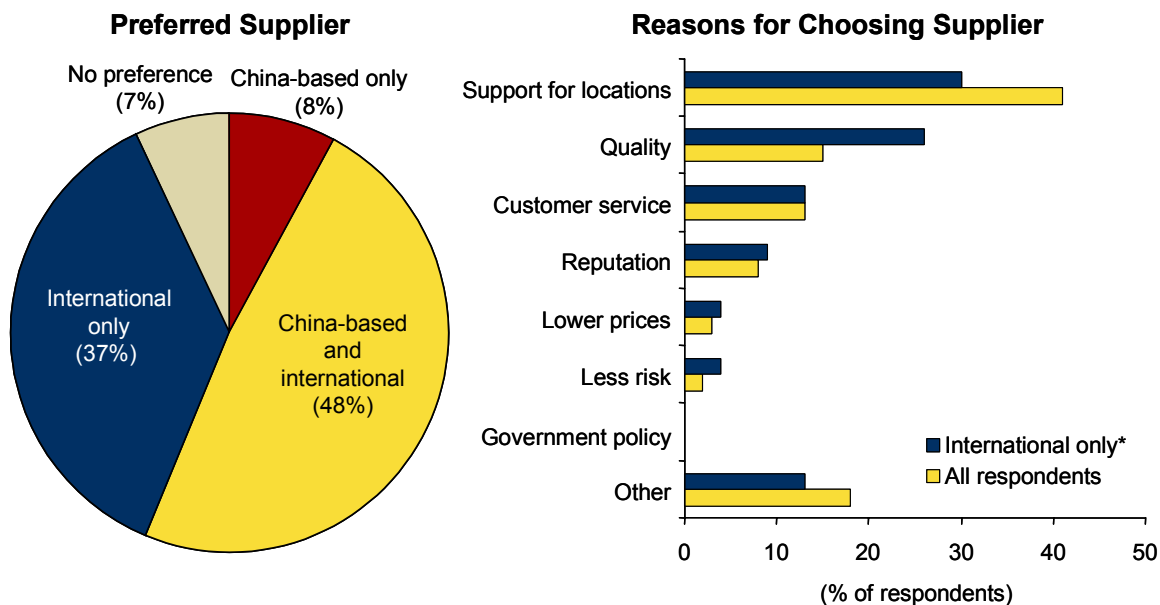
¹⁷ A phone survey of 100 executives took place in December 2005 and was conducted with IT or business executives with responsibility for IT spending. Only organizations with over 500 employees in all their branches were polled. The sample was stratified by size class and industry to be representative of China's installed base of IT within enterprises with over 500 employees. Industry distributions were manufacturing, 27%; financial, 18%; retail/wholesale, 13%; public sector, 13%; and other, 29%.

In January 2006, IDC conducted a follow-on survey of large Chinese firms to ascertain if there is a difference in the attributes desired of China-based suppliers and those desired of international software and IT services suppliers.¹⁸ Figure 12 shows the results of this survey of this top echelon of IT-using companies in China.

Within this group, IDC could find no clear attribute that would make a customer choose one type of vendor — China-based or international — over another. Rather, most respondents used products and services from multiple sources and chose suppliers based on which best met their needs for a given initiative. From the data, there appears to be a slight trade-off between choosing China-based companies for better local support and choosing international suppliers for the quality of their products and services. The sample, however, is relatively small, and additional data would be needed to draw clearer conclusions based on that difference.

FIGURE 12

Supplier Preference



n = 61

Notes:

* Internationally based software and IT services suppliers.

The "All respondents" category includes those who use local suppliers only and those who use a mix of local and international.

Source: IDC survey of top China CIOs, January 2006

¹⁸ This survey, also conducted by phone, polled executives who were candidates for the CIO of China awards. Their companies represent some of the most sophisticated and advanced IT-using companies in China. Of the 61 companies polled, two-thirds had over 2,500 employees; only two had under 1,100. Most of the companies were themselves multinationals, 41 were solely Chinese companies, 10 were China-based joint venture companies with non-Chinese partners, and 10 were local operations of companies headquartered outside China.

EMPLOYMENT AND TAX BENEFITS FROM SOFTWARE AND IT SERVICES FIRMS

International Firms

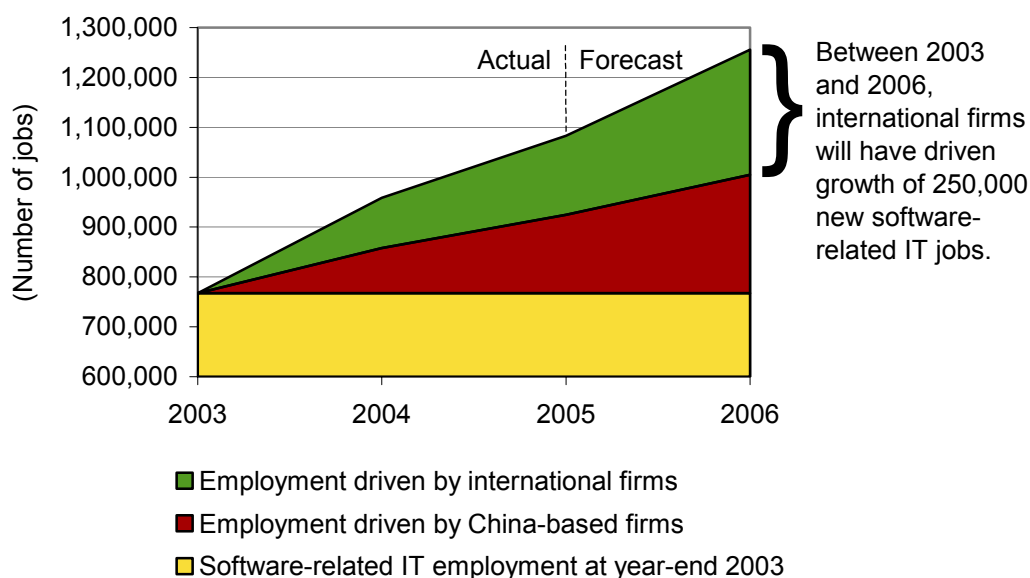
IT investment generates positive returns throughout the economy, including the creation of new jobs, which in turn increases tax receipts.

Since 2001, IDC has conducted studies in 70 countries on the relationship between IT spending and employment and tax receipts within the country.¹⁹ Employment is measured both within IT vendors and within IT-using organizations; taxes include taxes and fees on corporations and individuals, including consumption taxes.

For this white paper, we have used our market share data for software and IT services firms to allocate the benefits driven by local IT spending and exports between China-based companies and international companies. At current market shares, international companies account for just over half of 2005 employment and tax revenues related to software.²⁰ **Figure 13** shows the growth of software-related employment by supplier type from 2003 through 2006.

FIGURE 13

Software-Related Job Growth by Supplier Type



Source: IDC's IT Economic Impact Study, 2006

¹⁹ These studies have been conducted for the Business Software Alliance and other IDC customers and, to a large extent, put into the public domain.

²⁰ A lot of employment and therefore tax revenues are tied up in hardware domestic spending and export, and many of those hardware companies employ software engineers. Software-related employment at hardware IT and component companies was not counted in the software employment numbers; employees in the IT departments focused on software were counted, however.

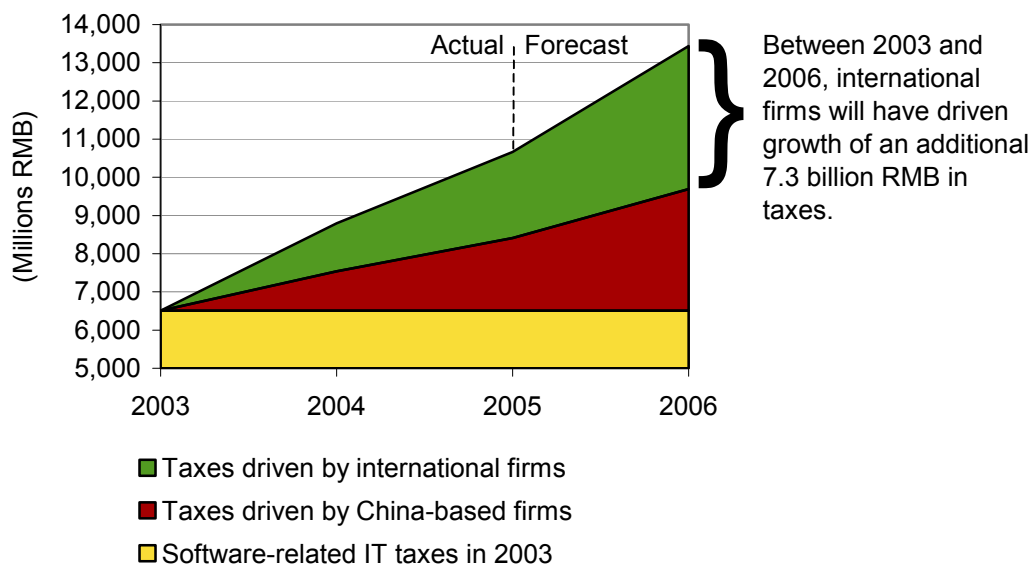
Using 2003 as a baseline, IDC's analysis reveals that software-related employment in China will increase by over 500,000 jobs by the end of 2006 to a total of more than 1.2 million, with Chinese firms accounting for 50% of this growth. This is a dramatic increase with positive reverberations throughout the Chinese economy.

Increased tax revenues are among the important effects of this increased employment. IDC estimates that total IT-related tax benefits were over \$3.3 billion (27.3 billion RMB) in 2005, up over 40% from \$2.3 billion (19.1 billion RMB) in 2003. By 2006, *software-related* tax revenues will be twice as large as in 2003, reaching almost \$1.6 billion (13.3 billion RMB) — compared with \$0.8 billion (6.6 billion RMB) in 2003.

Figure 14 shows the growth in software-related tax revenues. From 2003 through 2006, international firms will have generated over an *additional* 7 billion RMB of software-related tax revenues.

FIGURE 14

Software-Related Tax Revenue Growth by Supplier Type



Source: IDC's IT Economic Impact Study, 2006

Local Firms

China-based firms are also making a tremendous contribution to the economy by creating jobs, sales, and taxes. Not only are these firms responsible for a good portion of the growth of the domestic market, but they also are increasingly exporting software and IT services and providing balance for international counterparts.

This is true across a range of software types. For example, companies such as Rising, Kingsoft, and Jiangmin have helped drive growth in the security software market, where China-based companies have over 60% market share. In ERM, UFIDA

and Kingdee are the top 2 suppliers in China. Six of the top 10 customer relationship management (CRM) suppliers in China are China-based companies.²¹ In service industry applications, all but one of the top 10 suppliers is China-based.²²

In the IT services sector, 10 of the top 20 suppliers are China-based, with companies such as CS&S, Lenovo-AsiaInfo, and CE Dongli Technology growing faster than the market.

IDC's market share statistics for software firms and IT services firms show little change over the past few years in the mix of China-based and international companies. Both types of companies are investing to keep up with demand and the opportunities in China. In addition, a vast number of smaller, local IT services firms — over 8,000 by IDC's count — are active within China. Without these firms, it is unlikely that China's small and medium-sized businesses could modernize as fast as they have or will.

Just as the international companies look at China as an expansion market, so do the China-based companies look at the world outside China as an expansion market. From the data portrayed in **Figure 12** earlier, where over 56%²³ of respondents worked with local companies, it seems clear that China-based companies are increasingly able to support their China-based international customers outside China.

INTERNATIONAL FIRMS HELP DRIVE LOCAL REVENUES

The balance between China-based firms and international firms is perhaps best shown by looking at revenues generated by local firms working with the products and services of international firms. Using market share data and information on software shipments by operating system to allocate local software and IT services revenues to that which runs on, works with, or is otherwise associated with international software, IDC quantified the contribution of international software and IT services suppliers to local revenues. Examples are China-made business intelligence software that works with international ERM systems or local IT services installing international CRM systems. Distribution revenues are those associated with both international software and IT services and local software and IT services that are tied to international software.²⁴

²¹ TurboCRM, AsiaInfo, UFIDA, Genesys, BroadVision, AsiaNet TP.

²² CS&S, Powerise, Hollybridge, Gitbuy, Founder Order, AsiaInfo, Newsky, Pansky, eBIS.

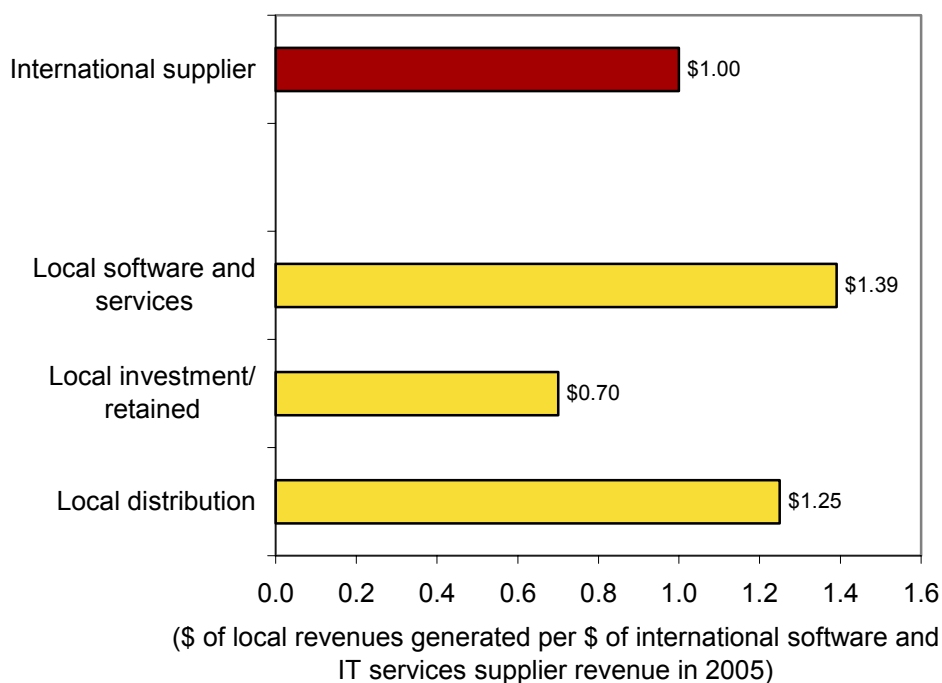
²³ 56% comprises 48% China-based and international and 8% China-based only suppliers illustrated in **Figure 12**.

²⁴ There is an inherent double-count in distribution revenues. Buyers spend with the channel, which in turn spends with its suppliers. In sizing markets, IDC eliminates all but the channel markup in order to get a true picture of demand. To assess employment or tax revenues, IDC uses the full revenues of channel firms because those revenues drive employment and therefore taxes. This is somewhat similar to the difference between GDP and gross industrial output.

Figure 15 shows the distribution of local revenues for each \$1.00 or 1 RMB of revenue to an international firm. IDC's analysis reveals that for every \$1.00 or 1 RMB of revenue in China to international software and IT services suppliers, there are at least \$2.50²⁵ or 2.5 RMB of revenue to related local China-based firms. By including additional investment in China — e.g., to support offshore R&D — each \$1.00 or 1 RMB generated by international firms produces an additional \$3.00 or 3 RMB in economic activity for the Chinese economy.²⁶

FIGURE 15

International Revenues Help Drive Local Revenues



Source: IDC's IT Economic Impact Study, 2006

Examples of how this cross-fertilization works abound:

- ☒ When Boshi Fund Management Company, founded in 1998, installed a CRM system in 2004, it did so with a mix of local and international companies. The basic software came from Microsoft, Oracle, and Onyx, while systems design, customization, and ongoing maintenance were handled by China Eagle and North 22. Thus, much of the money spent on the project by Boshi flowed into China's economy — through both the international software developers' local operations and China Eagle and North 22.

²⁵ This figure is related to but not quite the same as the figure earlier in the paper of \$2.25 worth of IT services channel revenue sold per \$1.00 of software. This figure puts that general relationship into the specific China context and includes the sale of local software in the \$2.50.

²⁶ A detailed description of the methodology of calculating the numbers in **Figure 15** is included in the Study Definitions and Methodology section at the end of the paper.

- ☒ In 2004, when CITIC Securities Company, the first of the three securities companies appraised by the China Securities Regulation Commission, built its centralized transaction system, it did so with software from IBM, Microsoft, and others, but the system implementation and development was handled by local company Jinzheng.
- ☒ When IPCore, China's pioneering ASIC design services firm, went to market with its advanced design kit that took component descriptions to CAD designs, it did so using software from Cadence. The software was designed by Cadence based on the CMOS process technology developed by Central Semiconductor Manufacturing Company (CSMC) of China. Hence, Cadence's investment in this new software has enabled many more dollars in revenue to IPCore and CSMC.

CONCLUSION

For China's economic growth to continue at or close to double-digit rates, the literature and research indicate that investment in IT must continue at a pace that exceeds that of GDP growth. At the firm level, IT investments generate organizational benefits beyond simply the ROI of one project after another. At the country level, these firm-level effects add up, aiding economic growth and improving the living standards of citizens.

Today, IT is delivered to the market through a mix of entities — China-based local suppliers, China-based international firms, joint ventures between Chinese companies and international companies, and directly from international companies. The research with CIOs and IT executives within China indicates that the market both requires and is well-served with this mix of local and international suppliers.

The research by IDC indicates that international software and IT services firms make a substantial contribution to China's economy — by creating jobs and additional local revenues such as through China-based suppliers working with international products.

IDC believes that the data shows that China's dramatic economic growth will be enhanced for years to come on this healthy balance between international suppliers and an increasingly robust Chinese IT industry.

TABLE 1**IT Market Growth and Local and International Contributions**

China	2003	2004	2005	2006	2003–2006 CAGR (%)
Spending (US\$M, constant)					
IT hardware	17,998.3	20,351.2	22,386.2	25,119.4	11.8
Software	2,139.6	2,667.2	3,010.5	3,526.8	18.1
IT services	3,441.1	4,309.8	5,097.3	6,075.4	20.9
Total IT	23,579	27,328	30,494	34,722	13.8
Spending (million RMB)					
IT hardware	149,156	168,655	185,519	208,170	
Software	17,731	22,103	24,948	29,227	
IT services	28,517	35,717	42,243	50,348	
Total IT	195,404	226,475	252,710	287,745	
% growth					
IT hardware	8.1	13.1	10.0	12.2	
Software	5.5	24.7	12.9	17.2	
IT services	1.4	25.2	18.3	19.2	
Total IT	6.8	15.9	11.6	13.9	
% international					
Software	75	75	75	75	
IT services	44	43	42	42	
International spending (million RMB)					
Software	13,298	16,578	18,711	21,920	18.1
IT services	12,548	15,358	17,742	21,146	19.0
Total	25,846	31,936	36,453	43,066	18.6
Local spending (million RMB)					
Software	4,433	5,526	6,237	7,307	18.1
IT services	15,970	20,358	24,501	29,202	22.3
Total	20,402	25,884	30,738	36,509	21.4
Average FX (local currency)	0.12	0.12	0.12	0.12	
GDP (US\$B)	1,757	1,931	2,085	2,246	8.5
IT/GDP (%)	1.34	1.42	1.46	1.55	
IT tax revenues (million RMB)	19,415	23,725	27,707	33,138	
IT tax revenues % of GDP	0.13	0.15	0.16	0.18	
Software-related tax revenues (million RMB)	6,511	8,799	10,662	13,442	27.3
International software-related tax revenues (million RMB)	3,639	4,860	5,785	7,275	26.0
Local software-related tax revenues (million RMB)	2,872	3,939	4,878	6,167	29.0
Number of employees					
IT hardware	993,510	1,067,931	1,124,742	1,189,768	6.2
Software vendors	157,213	186,352	207,053	235,636	14.4
IT services	71,995	82,901	91,989	102,579	12.5
Channels	425,573	482,932	527,372	581,516	11.0
IT professionals	1,098,193	1,281,186	1,425,671	1,605,327	13.5
Total number of employees	2,746,484	3,101,302	3,376,827	3,714,826	10.6
Software-related services and channels	143,637	178,318	199,900	229,499	16.9
Other IT services and channels	353,931	387,515	419,461	454,596	8.7
Software-related IT professionals	466,720	593,811	675,982	790,557	19.2
Other IT professionals	631,473	687,375	749,689	814,770	8.9
Total software employees	767,570	958,481	1,082,935	1,255,692	17.8
Total number of IT employees	2,746,484	3,101,302	3,376,827	3,714,826	10.6
International software-related employees	428,958	529,398	587,526	679,588	16.6
Local software-related employees	338,612	429,084	495,410	576,105	19.4

Source: IDC, 2006

STUDY DEFINITIONS AND METHODOLOGY

- ☒ **IT spending** refers to spending by consumers, businesses, governments, or educational institutions on information technology, including hardware, software, IT services, and data networking, as measured in IDC's *Worldwide IT Spending Patterns* studies (the *Worldwide Black Book*). This spending *excludes* all telecommunications services revenues and some smaller emerging technology areas such as video games (although PC gaming software *is* included). The figures are in 2004 USD or RMB at a constant exchange rate of 0.1207 USD to 1 RMB.

IDC has tracked IT spending for 40 years and within China for at least 15. Sources include vendor shipments, channel estimates, and end-user surveys. Total IT spending is derived by adding up over 200 component markets, from PCs and laptops to application development software, ERM systems, and IT training and education. Within the IT industry, IDC is considered the "gold standard" for IT spending figures. Within China, IDC has detailed tracking services in PCs, servers, network equipment, output, software, and IT services.

- ☒ **Tax revenues** are potential value-added tax (VAT) or sales tax revenues from the sale of IT hardware, software, or IT services, as well as business and personal income, social taxes, or consumption taxes or fees.

The basic approach is to take total taxes within a country and determine which proportion is attributable to IT activities. The country totals for taxes and total employment are taken from published statistics, while total IT employment or sales were taken from IDC's Economic Impact Model. The share of IT employment as a percentage of total employment is applied to the total social/personal taxes and adjusted based on assumptions that IT employees have higher income than the average employee in a country. IT-related VAT taxes were calculated by analyzing the total IT spending in a country, determining what portion would be subject to rebate, and then applying the VAT rate.

- ☒ **IT employment** refers to the number of people employed (full-time equivalents) in hardware, software, IT services, or channel firms. The definition *excludes* employment in occupations in IT-related industries, such as Web graphics design, venture capital, trade magazine publishing, and so forth.

Headcounts by category were first modeled based on estimated IT revenue per employee for hardware, software, or IT services companies based on standard ratios and by levels of spending per employee by technology type for channels employees and IT professionals. IDC had excellent inputs for modeled employment figures, including published data over the past four years of economic impact studies. Headcounts were also checked with current published statistics by IDC analysts in China in late 2005.

- ☒ **International software and IT services spending, employment, and tax revenues** refer to spending on the products and services of non-China-based multinational suppliers, regardless of distribution channel (e.g., Oracle software sold as part of a systems integration contract between a China company and a China IT services firm would still qualify as a sale of international software). Percentage allocations were developed using IDC's Asia/Pacific Software and IT Services Trackers, which are products sold by IDC customers and which track the China market along with others in Asia/Pacific. The ratio of international IT spending to total spending was applied directly to determine employment and tax revenues. IDC understands that international companies may have different headcount-to-revenue ratios within China as well as different tax rates, but they were offset by additional foreign direct investment and employment to support exports. Hence, using the single measure seemed simpler.

- ☒ **Local vendor software and IT services spending, employment, and tax revenues.** See above. This is the equivalent spending with local, China-based companies.

- ☒ **Software-related taxes, revenues, or employment** refer to the percentage of spending, employment, or tax revenues that can be associated with the creation, installation, servicing, or distribution of software. It is developed by first analyzing 13 service categories and developing through IDC research the percentage of that activity that is devoted to software (e.g., what percentage of IS outsourcing is outsourcing software management and what percentage is related to managing hardware). This leads to a ratio of software spending to IT services spending. For the purposes of allocation of employment and taxes, internal IT departments are assumed to resemble external service organizations and headcount is allocated accordingly. The allocation of channels activity to software is the midpoint between the percentage of software spending to the total of software and hardware spending and the percentage of IT services that is software-related.

- ☒ **IT spending and exports.** In our calculations of employment and tax revenues, IDC includes employment related to domestic IT spending as well as employment related to IT exports. At the moment, China imports more software and IT services than it exports. It exports more hardware than it consumes domestically. However, in any spending figures that must be compared with IDC IT spending figures, only domestic IT spending is included.

- ☒ **Local revenues driven by international suppliers** refer to spending on local software that runs on software from internationally based companies or local IT services around that software or the local software that runs on international software. This was determined by using market share statistics in software to determine how much software worked on international operating systems or with international software, then applying the software-related services activity allocations to that software.

- ☒ **Channel revenues.** Within calculations of employment and tax revenues, IDC uses a figure for channel revenues to drive estimates of employment and therefore taxes. In this case, channel revenues are equated to 100% of IT spending. Most of that goes back to the hardware, software, and IT services suppliers, but it is that revenue that funds employment. Within our tracking of IT spending, IDC looks only at channel markup, which is the difference between IT spending and vendor revenues.
- ☒ **Foreign investment in China.** Data was collected on the top 10 software and IT services through interviews and desk research and on FDI totals for 2005 (from the U.S.-China Business Council and other published information). Standard spending ratios were adapted from previous proprietary engagements as well as IDC research on marketing mix and sales activities. (IDC has research practice areas on both IT marketing and IT sales and distribution.) A pro forma income statement was then prepared for the China software and IT services market, with estimates based on this activity-level knowledge as to what percentage would be retained or spent in China. For example, only 10% of R&D and 20% of product development (mostly to support localization) and 90% of services cost of goods sold, since that is mostly service delivery to China-based firms, were considered local. Most product marketing was spent outside China, while most other marketing (advertising and trade shows) was spent inside China. Other foreign direct investment was developed using estimates for the top 5 companies (software and IT services only) and an estimate that "all other" accounted for less than that of the top 5. Total software and IT services FDI was less than 1% of total FDI for 2005.

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